

E  
X  
H  
I  
B  
I  
T

**IN THE UNITED STATES DISTRICT COURT FOR  
THE NORTHERN DISTRICT OF GEORGIA  
ATLANTA DIVISION**

## FIFTH SUPPLEMENTAL DECLARATION OF PHILIP B. STARK

**PHILIP B. STARK** hereby declares as follows:

1. This statement supplements my declarations of September 9, 2018, September 30, 2018, October 22, 2019, and December 16, 2019. I stand by everything in the previous declarations.

## I. False Assertions about the Fulton County Pilot Audit

2. Secretary of State Raffensperger issued the following (undated) press release on approximately June 30, 2020:<sup>1</sup>

## AUDIT SUPPORTS PRIMARY OUTCOME

**(ATLANTA)** – A pilot post-election audit Monday confirmed the outcomes of the presidential preference primaries in Fulton County, Secretary of State Brad Raffensperger announced today.

“This procedure demonstrates once again the validity of the results produced by Georgia’s new secure paper-ballot system,” [SOS Raffensperger] said. “Auditing

<sup>1</sup> [https://sos.ga.gov/index.php/general/audit\\_supports\\_primary\\_outcome](https://sos.ga.gov/index.php/general/audit_supports_primary_outcome) last visited 27 July 2020.

returns can now be a regular part of elections because we have paper ballots. That gives Georgians confidence that their votes are counted fairly and accurately.”

The June 9 primary was the first statewide use of Georgia’s new secure paper-ballot system. Its use was piloted in last fall’s municipal elections and in two special legislative elections held in January and February. Audits of municipal voting and one of the special elections showed the system produced accurate results in both cases.

Monday’s audit was a risk-limiting audit. It consisted of manually examining a random sample of paper ballots in a selected race to ensure the correct result was reported by the election equipment. Both parties’ presidential primary contests were audited, with the Democratic race driving the audit due to its smaller margin of victory.

Officials from the Fulton County Board of Registration and Elections conducted the audit along established procedures agreed upon by national voting-integrity experts.

3. This statement is false and misleading, as I shall explain.
4. First, the so-called audit (a better description would be a “pilot of some procedures involved in conducting a risk-limiting audit”) did not “confirm” any outcome. At best, it provided statistical evidence that *within Fulton County*, more ballots available for audit in the Presidential Preference Primaries had votes for the reported winners than for any other candidate. That does little if anything to confirm who won the Georgia Presidential Preference Primaries, i.e., that the contest outcomes were correct.
5. Second, the “audit” did not confirm the “validity of the results” of the election, nor that the votes were counted accurately, nor did it “show[] the system produced accurate results [].” It did not check the accuracy with which the votes on any ballot or group of ballots was counted, nor whether the reported winners of the Presidential Preference Primaries really won. It did not check any vote tallies.

6. Third, the “audit” was not a risk-limiting audit. By definition, a risk-limiting audit has a known minimum chance of correcting the reported election outcome if the reported outcome is wrong. However:

- a. Auditing in Fulton County alone cannot make such a guarantee: that requires a statewide audit, because the contests are statewide.
- b. The “audit” relied on many “remade” or “duplicated” ballots. Supplemental Declaration of Rhonda J. Martin, 23 August 2020, at ¶5–11, 15–16, 24–25. Errors in remaking ballots would not be detected by this “audit.” Indeed, this “audit” *assumed* there were no errors in the duplication process, rather than checking whether duplication errors, if any, might have contributed to altering the reported outcome.
- c. The “audit” relied on BMD printout. Errors in the BMD printout would not be detected by this audit and cannot be detected by *any* audit.<sup>2</sup>
- d. To the best of my knowledge, no steps were taken to ensure that the collection of ballots subject to audit was trustworthy. In particular, the numbers fed into the software for total ballots and votes for the various candidates disagree with those posted on the SOS website. Supplemental Declaration of Rhonda J. Martin, 23 August 2020, at ¶18, 31.

---

<sup>2</sup> Appel, A.W., R. DeMillo, and P.B. Stark, 2020. Ballot-Marking Devices Cannot Ensure the Will of the Voters, *Election Law Journal*, DOI [10.1089/elj.2019.0619](https://doi.org/10.1089/elj.2019.0619). Appel, A.W. and P.B. Stark, 2020. Evidence-Based Elections: Create a Meaningful Paper Trail, Then Audit, *Georgetown Law Technology Review*, 4, 523–541.

e. The “audit” was conducted after the election results were certified. I understand that therefore, under Georgia law, it had no possibility of correcting the reported outcome if the reported outcome was wrong.

7. Fourth, the “audit” did not follow “established procedures agreed upon by national voting-integrity experts.” The consensus document on post-election audits is entitled “Principles and Best Practices for Post-Election Tabulation Audits”<sup>3</sup> (*Principles* henceforth). *Principles* has been endorsed by the following entities:

- American Statistical Association
- Brennan Center for Justice
- Center for Democracy and Technology
- Center for Internet Security
- Citizens for Election Integrity Minnesota
- Common Cause
- Connecticut Citizen Election Audit
- Florida Voters Foundation
- Georgians for Verified Voting
- National Election Defense Coalition
- Protect Democracy
- Public Citizen
- Verified Voting Foundation

8. Here are some (not all) of the principles and best practices that the June, 2020, Fulton County “audit” did not follow:

a. “The audit treats as authoritative only marks on paper that the voter could verify. It does not rely upon the accuracy of [] remade ballots or other unverified products of the election system [] Remade (or duplicated) ballots cannot be verified by the voter, so only the originals can be used in the audit.” *Principles*, at

---

<sup>3</sup> <https://www.verifiedvoting.org/wp-content/uploads/2019/01/Audit-Principles-Best-Practices-2018.pdf> last visited 27 July 2020.

8. This “audit” relied on re-made ballots, which voters had no opportunity to verify, and on BMD printout, which is a largely unverified product of the election system.<sup>4</sup>

b. “The public has sufficient access to witness the random drawing, ballot retrieval, and other audit procedures, and to verify that voter marks are interpreted correctly on the audited ballots.” *Principles*, at 10. But the public was not able to see individual ballots and verify that voter marks were correctly interpreted and correctly entered into the software. Supplemental Declaration of Rhonda J. Martin, 23 August 2020, at ¶29.

c. “The public is provided with all necessary information to replicate all decisions and calculations made in support of the audit.<sup>14</sup> The tabulated vote subtotals by audit unit (if such subtotals are used in the audit) and overall totals are published (presumably on the official elections website) or committed<sup>15</sup>, before the random selection of audit units, as is the ballot manifest that details how the ballots are stored.” *Principles*, at 10. But the reported contest results were not published before the audit, nor (to the best of my knowledge) was the ballot manifest. The published results differed substantially from those used in the “audit.”

Supplemental Declaration of Rhonda J. Martin, 23 August 2020, at ¶18.

---

<sup>4</sup> DeMillo, R., R. Kadel, and M. Marks. 2018. What Voters Are Asked to Verify Affects Ballot Verification: A Quantitative Analysis of Voters’ Memories of Their Ballots, SSRN <https://ssrn.com/abstract=3292208>, last visited 27 July 2020. Bernhard, M., A. McDonald, H. Meng, J. Hwa, N. Bajaj, K. Chang, and J.A. Halderman, 2020. Can Voters Detect Malicious Manipulation of Ballot Marking Devices? *IEEE Proc. Security & Privacy*, 1, 679-694. DOI [10.1109/SP40000.2020.00118](https://doi.org/10.1109/SP40000.2020.00118).

- d. “All the ballots being tabulated and audited must be verifiably protected from loss, substitution, alteration or addition.” *Principles*, at 12. There is no evidence that the ballots, many of which were cast in March, were adequately protected, much less verifiably protected: the security of the chain of custody has not been established.
- e. “Compliance audits assess the trustworthiness of the paper trail.<sup>18</sup> These compliance audits include ballot accounting to prevent the addition, subtraction, substitution, or alteration of ballots, polling place reconciliations (e.g., comparing counts of voters voting to ballots cast); reconciliation of other vote types (e.g., confirming that the number of absentee ballots received matches the total of absentee ballots counted and absentee ballots rejected); and reconciliation to ensure that all votes from all audit units are correctly summed in the election totals.” *Principles*, at 12. There is no evidence that any form of compliance audit was undertaken, much less that a compliance audit generated affirmative evidence that the collection of ballots used in the audit were trustworthy.
- f. “Any information (e.g., counts of ballots in batches scanned) taken from the vote tabulating system is independently checked (e.g., by weighing ballot batches on a precision scale).” *Principles*, at 12. There is no evidence that the counts of the ballots were verified; it appears that Fulton County relied on the voting system to report how many ballots there were. This is tantamount to asking the same doctor for a second opinion.
- g. “All jurisdictions and all validly cast ballots, including absentee, mail-in and accepted provisional ballots, must be taken into account. [] The ballots from all

jurisdictions involved in a contest are subject to audit. Because the type of equipment in each jurisdiction may vary, the audit method may differ between jurisdictions, but the statistical analysis is based on the audit results for all jurisdictions.” *Principles*, at 13. As mentioned above, only Fulton County ballots were taken into account in contests that included many jurisdictions. The “audit” ignored the fact that the Presidential Preference Primaries involve *all* Georgia counties. This failure suffices to prevent the audit from being a risk-limiting audit.

- h. “No contest should be excluded a priori from auditing [] All contests are subject to some degree of possible auditing [].” I understand that the Democratic Presidential Preference Primary was announced to be the contest that would be audited long before the certification of the results and the “audit”; there was no possibility that any other contest would be audited.<sup>5</sup> Supplemental Declaration of Rhonda J. Martin, 23 August 2020, at ¶13.
- i. “Statistical experts knowledgeable about post-election audits participate alongside stakeholders in designing the audit process.” *Principles*, at 14. To the best of my knowledge, no one with any statistical expertise, particularly in post-election audits, was involved in the design of this “audit.”<sup>6</sup>
- j. “Audits, including any full hand counts that result, must be completed in time to change official outcomes if hand counts so indicate.” *Principles*, at 17. I

---

<sup>5</sup> I understand that the Republican Presidential Preference Primary was audited “opportunistically” (rather than using a risk-limiting approach) but no contest other than the Presidential Preference Primaries was audited.

<sup>6</sup> I know and respect Ms. Monica Childers. She has a great deal of experience working with election officials, and she is, in my opinion, competent in her role as product manager for VotingWorks and very intelligent. However, I do not think she would claim to have statistical expertise, nor am I aware that she does.

understand that this “audit” was performed after certification and did not have the legal ability to change official outcomes.

9. The method of selecting the ballots to inspect manually that the Fulton County “audit” used is called “ballot polling.”
10. I invented risk-limiting audits and virtually every extant method for performing risk-limiting audits, including ballot-polling risk-limiting audits.<sup>7</sup> I was the first person to pilot a ballot-polling risk-limiting audit, in Monterey, CA, in May, 2011. I was a co-author of the first two publications describing ballot-polling risk-limiting audits. I published the first software tool to conduct ballot-polling risk-limiting audits.<sup>8</sup> That tool was the official tool used by the State of Colorado for its ballot-polling risk-limiting audits and is referenced in Colorado election regulations.
11. The VotingWorks Arlo software used in the Fulton County audit incorporates my algorithm, and I understand that VotingWorks benchmarked the Arlo software against mine to confirm theirs was a correct implementation of the algorithm. Ben Adida, personal communication, 2019.
12. A ballot-polling risk-limiting audit does not check the tabulation of votes, *per se*. It just checks whether anyone other than the reported winner got as many or more votes than the reported winner got in a given collection of ballots. It does not check whether any ballot or any group of ballots was tabulated correctly. Every single vote could have been mistabulated and yet the reported winner could still have really won. A ballot-polling

---

<sup>7</sup> I coined most of the common terminology in the field, too, including “risk-limiting audit,” “risk limit,” “comparison audit,” “ballot-level comparison audit,” “batch-level comparison audit,” “ballot-polling audit,” “risk-measuring audit,” “measured risk,” “ballot manifest,” “compliance audit” (in the context of elections), and “evidence-based elections.”

<sup>8</sup> <https://www.stat.berkeley.edu/~stark/Vote/ballotPollTools.htm> last visited 27 July 2020.

audit would not detect that, because the outcome is correct despite the complete mistabulation.

13. Moreover, there are many things a ballot-polling audit does not check that are crucial to verifying election results and confirming outcomes. Among them are the following:

- a. Risk-limiting audits do not check whether the collection of ballots from which the sample is drawn is the “right” collection, i.e., whether it contains every validly cast ballot and no others. (That is the role of the compliance audit.)
- b. Risk-limiting audits do not check whether the votes were recorded correctly. (No audit of BMD printout can check that.)
- c. Ballot-polling risk-limiting audits do not check the tabulation of any ballot nor any group of ballots, except in the sense that they check whether the reported total was wrong by more than the reported margin.<sup>9</sup> In the matter at hand, the “audit” did not even check whether the reported total for the contest was wrong by more than the reported margin, because it sampled only from Fulton County. Whether the reported winner of Fulton County really got more votes than other candidates in Fulton County does not determine whether the overall reported winner of the Georgia Democratic Presidential Preference Primary really won.

14. In a commencement speech at Caltech in 1974, Nobel Prize-winning physicist Richard Feynman discussed work that has some of the appearance of science but does not actually practice the scientific method. He called such activity *cargo-cult science*.<sup>10</sup> The term is

---

<sup>9</sup> Comparison audits, a different approach to risk-limiting audits, do check the tabulation of groups of ballots or individual ballots.

<sup>10</sup> Richard P. Feynman, R. Leighton, and E. Hutchings, *Surely you’re joking, Mr. Feynman!* W.W. Norton, 1985.

derived from Melanesian cultures that had an influx of various goods during World War II as a result of military presence on the islands. Postwar, some of those societies tried to lure the cargo planes back by making faux landing strips, using fires as runway lights, and pretending to communicate with planes using wooden headsets. They imitated what they had seen with no understanding of what it signified nor why it worked in the past. It was a pointless ritual.

15. So far, Georgia's election "audits" are pilots of some auditing procedures, but they are not true risk-limiting audits. From the perspective of election integrity, they are *cargo-cult audits*. They use some of the procedures, terminology, and software involved in actual risk-limiting audits, but not in a way that is probative. The Secretary of State evidently has little understanding of what is actually necessary to provide evidence that election results are correct and trustworthy and little understanding of the limitations of the procedure pilots that have been conducted, including the June pilot in Fulton County. Georgia's "audits" have had about as much chance of catching outcome-changing errors as the cargo cult rituals had of summoning cargo planes.

16. Moreover, the ballot marking devices, vote tabulation equipment, and ballot duplication and handling procedures could have malfunctioned materially—enough to change the reported outcome of the primary—and the "audit" would have little or no chance of detecting the problem, and no chance whatsoever of correcting the problem.

17. The Fulton County pilot was worth doing. It gave Georgia more experience with some (not all) of the procedures involved in conducting a *bona fide* risk-limiting audit. But it was not a risk-limiting audit. From the perspective of checking whether the reported winners of *this* election really won, it was just a ritual. It did not show that any election

outcome is correct, that any ballot was tabulated correctly, that any election equipment functioned properly, or that Georgia's elections are trustworthy.

## **II. Proposed New Election Rules**

18. New rules have been proposed for the State Elections Board, per NOTICE OF INTENT TO POST A RULE OF THE STATE ELECTIONS BOARD, TITLE 183-1, RULES OF STATE ELECTION BOARD, CHAPTER 183-1-15, RETURNS OF PRIMARIES AND ELECTIONS AND NOTICE OF PUBLIC HEARING, dated 11 August 2020, which announced a hearing to occur on 10 September 2020.
19. Proposed 183-1-15-.04 addresses auditing.
20. The proposed rule is grossly deficient. I shall give several examples.
21. First, the rule calls for auditing only one contest every two years. Statistics is a powerful tool, but auditing one contest among dozens does not magically show that the outcome of any other contest is correct. Procedural failures and other human errors, misconfiguration, and hacking may and do affect some contests but not others. The proposed rule is analogous to claiming that a car is safe if one of its brakes is inspected every other year, or that an employee's expense reports are accurate if an auditor checks one receipt every other year. Every contest in every election should receive some scrutiny. See paragraph 8(h), *supra*.
22. Second, the rule allows the Secretary of State to select the contest for audit, and explicitly allows the Secretary to make that selection on political grounds. That has at least three bad consequences: (i) The vast majority of contests have zero chance of being audited, and thus the "threat" of audit will not deter malfeasance. (ii) Audits can be politicized and weaponized, rather than serving to provide a scientific basis for assessing whether

election results are trustworthy. (iii) The Secretary of State may face political pressure in selecting the contest to audit. For instance, local election officials might want to minimize their workload by auditing the contest expected to require the least effort—i.e., the contest with the widest margin.

23. Third, the rule says the audit “shall be open to the view of the public and press.” That is important but insufficient: it does not ensure that the public and the press can observe *in adequate detail to determine whether the audit was conducted correctly*. The public needs to be able to confirm that the audit did not stop prematurely; otherwise, there is no reason the audit should inspire trust. To tell whether the audit stopped prematurely, the public needs to be able to confirm (i) that the correct ballots were retrieved by the auditors, (ii) that the voters’ marks on those ballots were correctly interpreted by the auditors, and (iii) that the interpretations were correctly entered into the audit software. The public also needs evidence that the “ballot manifest” is complete and accurate and was used correctly in selecting the sample of ballots to inspect. (The rule does not ensure that ballot manifests are constructed without reliance on the voting system; see paragraph 8(f), *supra*.) For “comparison audits,” the public also needs to be able to confirm that the cast vote records or electronic subtotals used in the audit reproduce the reported contest results, and to confirm that those cast vote records or subtotals were used correctly in determining whether the risk limit was met. See paragraphs 8(b) and 8(c), *supra*.

24. Fourth, the rule does not provide for a “compliance audit” to establish whether the audit trail is trustworthy. See paragraphs 8(d) and 8(e), *supra*.

25. Fifth, the rule does not ensure that the Secretary of State receives enough information to determine whether the audit terminated prematurely. To “report the results of the audit” is

woefully non-specific; moreover, the rule does not require that the county reports be made available to the public.

26. Sixth, the rule does not ensure adequate attention to the security of the paper trail before, during, and after the audit. The provision for “a log of the serial numbers on the ballot containers” does nothing to ensure that seals were properly affixed and logged when the ballots were tabulated then inspected carefully for tampering before the audit, and that fresh seals were properly affixed, photographed, and recorded when the containers are closed at the end of the audit.
27. For a list of principles for election integrity legislation and regulation that addresses many shortcomings of the proposed rule, see Appel, A. and P.B. Stark, 2020. Evidence-Based Elections: Create a Meaningful Paper Trail, Then Audit, *Georgetown Law Technology Review*, 4, 523–541. <https://georgetownlawtechreview.org/wp-content/uploads/2020/07/4.2-p523-541-Appel-Stark.pdf>
28. In summary, the proposed audit rules are “security theater” unable to catch even serious, outcome-altering problems in the determination of voter eligibility, the recording of votes, the duplication of ballots, the chain of custody of ballots, nor—in the vast majority of contests—the tabulation of votes. And the rules do not ensure that the audit, even if it is conducted properly, produces public evidence that the audited outcome is trustworthy.

I declare under penalty of perjury, in accordance with 28 U.S.C. § 1746, that the foregoing is true and correct.

Executed on this date, 23 August 2020.

A handwritten signature in black ink, appearing to read "Philip B. Stark", is centered above a horizontal line.

Philip B. Stark